4.10 Brake Systems Maintenance Adjustment, Removal and Replacement.

The following instructions will guide the worker through maintenance, adjustment, removal and replacement of the brake systems. The following systems will be covered.

- Machine Brake
- Pawl Brake (Emergency Brake)

4.10.1 Machine Brake Maintenance and Adjustment

The following instructions will guide the worker through the maintenance and adjustment of the Machine Brake.

1. Remove the landing plates from the upper truss and connect the maintenance pendant. (See paragraph 4.1.2.3 for landing plate removal and replacement.

2. Remove 6 to eight steps and move opening over the machine brake area. (See paragraph 4.2.2 for step removal and replacement.

3. Check condition of wiring and sensors.

4. Clean brake with a clean dry cloth. Be sure to remove all brake dust. It may be helpful to use compressed air, this will assist with the cleaning to remove the dust form small areas. (Be sure to wear proper safety equipment when remove dirt from the brake with compressed air.)

5. Check the air gap. The factor air gap setting is .3mm[0.012”]. When the gap reaches .6mm[0.024”] the air gap should be adjusted.

6. Precise adjustment is easily carried out using a socket wrench and a spanner wrench. Slacken the socket head cap screws to release the threaded spacers which can be adjusted in and out to change axial position of the armature and the mounting plate. This, in turn, changes the axial air gap which should be set to 0.25mm~0.35mm[0.010”~0.014”]. See Figure 4-44 Matrix Electromagnetic Brake illustration.

7. Check stopping distance under no-load conditions. (Stopping distance should be 8-12 inches.)
8. Check the brake torque. Required torque is specified on the label plate attached the brake cover. (97 to 117 ft-lbs.) for MB & SB (128 to 148 ft-lbs) for SSF. To check the torque do the following:

- Use a torque wrench that displays ft-lbs and a socket for a 10mm bolt.
- Using the bolt, hat is attaching the disk for the governor speed disk, attach the socket wrench and pull with a smooth steady motion.
- Just before the escalator begins to move check the indicator dial on the torque wrench. Be sure the torque is at proper reading. Adjust as needed.

9. To adjust the torque the following must be done:

- Loosen 2 setscrews on the torque adjusting ring.
- Loosen ring to increase the gap. This will decrease the torque.
- Tighten the ring to reduce the gap. This will increase the torque.
- Tighten the setscrews to lock the ring in position.

10. Check the hand brake cable to insure it is in proper operating order.

11. After adjustments are made replace steps, remove maintenance pedant and replace landing plates.
Figure 4-44 Matrix Electromagnetic Brake
4.10.2 Pawl Brake Maintenance and Adjustment

The following instructions will guide the worker through the maintenance and adjustment of the pawl brake system.

1. Remove the landing plates from the upper truss area and attach the maintenance pendant. See paragraph 4.1.2.3 for removal and replacement of the landing plates.
2. Remove 6 to 8 steps to gain access to the pawl brake cable. See paragraph 4.2.2 for step removal and replacement.
3. Using the maintenance pendant move the escalator as needed to gain access to the pawl brake cable.
4. Check the cable housing for damage.
5. Actuate the pawl brake by testing the broken drive chain device. This came done by removing the guide shoe.
6. After the guide shoe has been removed, actuate the broken drive chain device by allowing it to drop to the drive chain. This should push the cable in and actuating the pawl brake locking mechanism. Adjust the cable if needed.
7. Verify that the pawl is actuated and that it seats into the ratchet properly.
8. Check the condition of the guide shoe and replace if needed.
9. In sure that the limit switch trips when the pawl brake gets to with in 1 inch of the ratchet. This can be done by manually manipulating the pawl. Check LED #5 on the fault panel attached to the newel skirt, it should be illuminated.
10. Reset the pawl brake system after the inspection is complete. Before the escalator can be started the system has to be reset at the control panel.
11. Remove the maintenance pendant; replace the steps and landing plates.
Figure 4-45 Pawl Brake illustration
4.10.3 Machine Brake Removal and Replacement

The following instructions will guide the worker in the removal and replacement of the Machine Brake.

1. Remove the upper landing plates to gain access to the upper truss area. See paragraph 4.1 for instructions.
2. Attach the maintenance pendant to the service box in the upper truss.
3. Remove six to eight steps to gain access to the machine brake. Position the opening over the machine area exposing the machine brake. See paragraph 4.2 for instructions.
4. Engage the pawl brake at this time. Open the Lever Lock Box and with one hand hold the pawl in position and with the other depress the lever. This will clear the locking area and allow the lock lever to swivel out of the way releasing the pawl brake. Do not let the pawl drop, place it into position.
5. Remove the digital sensing head and disc from the machine brake. This is to avoid any unwanted damage when removing the brake.
6. Disconnect the manual release cable and remove threaded rod. Be sure to put threaded rod in a secure place.
7. Disconnect the brake temperature device. The connection is in the pull-box, which is located over the brake wear device. Be sure that the connector is removed from the pull box before removing the brake.
8. Loosen the setscrew that holds the torque-adjusting ring and remove the ring.
9. Three socket head screws mount the brake to the mounting plate. Remove these screws and carefully slide the brake from the shaft.
10. To replace the machine brake follow the directions in reverse order.
11. Before tightening the setscrews on the torque ring, set the air gap to the proper opening. (See Figure 4-46 Machine Brake Removal and Repair illustration for Millbrae and San Bruno.) (See Figure 4-47 Machine Brake removal and repair for SSF illustration for South San Francisco.)
Figure 4-46 Machine Brake Removal and Repair for MB & SB
Figure 4-47  Machine Brake removal and repair for SSF
4.10.4 Pawl Brake Removal and Replacement

The following instructions will guide the worker in the removal and replacement of the pawl brake.

1. Remove the landing plates from the upper truss area and attach the maintenance pendant. See paragraph 4.1.2.3 for landing plate removal and replacement.

2. Remove 2 or 3 steps and move the opening over the area of the pawl brake. See paragraph 4.2.2 for step removal and replacement.

3. Release the pawl brake from the locking device.

4. Remove the pawl brake mounting bolts and remove the pawl brake. Be sure to count the number of shims. The same number will need to be replaced.

5. Attach a hoist to the pawl and lift from the truss.

6. To replace follow instructions in reverse order.
Remove these mounting bolts

Pawl Brake

Figure 4-48 Pawl Brake Removal illustration